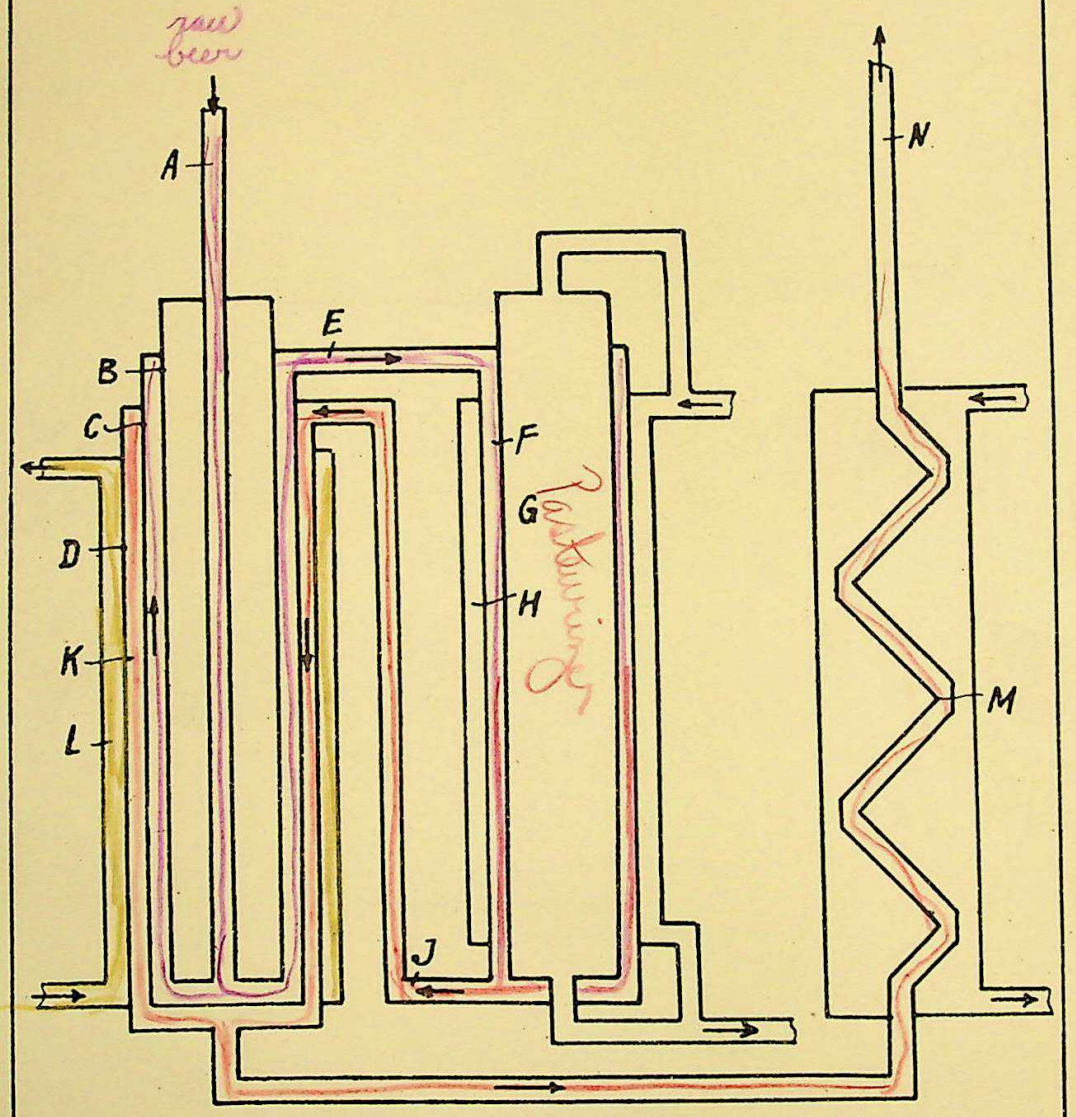
355.010 COMPLETE SPECIFICATION 1 SHEET

= raw beer
= pasteurized beer
= cooling brine



[This Drawing is a reproduction of the Original on a reduced scale.]

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Div. 5

PATENT SPECIFICATION

Convention Date (Austria): July 10, 1930.

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Complete Accepted: Aug. 20, 1931.

COMPLETE SPECIFICATION.

RECORDED

Process of and Apparatus for Sterilising Beer.

We, BERNDORFER METALLWARENFABRIK ARTHUR KRUPP AKTIENGESELLSCHAFT, a Corporation organised under the Laws of Austria, of Berndorf, Austria, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a process of and apparatus for sterilising beer.

The sterilising of beer is generally unsuccessful for the reason that the beer cannot stand the high temperature entailed the process; its flavour is changed and it sometimes even becomes unpalatable. As a rule, therefore, one is content with pasteurising the beer, since the temperature of about 60° C. required for this process is harmless to most beers, even when maintained for a considerable time. The protracted nature of the pasteurising process is however, a considerable inconvenience to the management, and moreover, pasteurised beer is not stable under all conditions, especially in the tropics.

It has now been ascertained that beer can be subjected to sterilisation—that is heating to 96—110° C.—without injury, in that, in association with several germicidal measures and preheating, the duration of the exposure to a high temperature is restricted to a few (1—2) seconds, and the escape of carbon dioxide is prevented by the application of pressure.

It has already been proposed to sterilise liquids such as milk or beer by passing them in the form of a layer of about 1 mm. thickness between heated metal walls formed for example by coaxial tubes, along a long path at a rate of flow of the liquid of about two metres per second, said walls being preferably made of a metal such as copper having a good heat conductivity and being maintained at a temperature of 120 to 135° C. Moreover in other sterilising processes in which the liquid to be passed is passed through heated tubes, it has been proposed to employ pressures of for example, 40 atmospheres for the sterilising process.

In other processes for sterilising beer under pressure it is known to employ vessels having internal surfaces made of or lined with silver or other precious metal or alloy.

In contradistinction to the foregoing proposals, the present invention provides a process for sterilising liquids such as beer, which comprises heating the liquid to be sterilised to a temperature of about 100° C, by passing it in the form of a layer or film not exceeding 1 mm. thickness, under a pressure of from about 10 to 15 atmospheres, over heated surfaces coated with or consisting of a metal adapted per se to exert by contact a high germicidal power, for a period of about 1 to 2 seconds and thereupon cooling said liquid.

The hereindescribed process and apparatus enable beer to be successfully sterilised under these conditions, and without any injury to the flavour and without loss of carbon dioxide. The beer is first maintained at a temperature of up to 50° C. and is then heated to about 100° C. in the apparatus in the condition of a very thin layer (1 mm. thick at the most). At the same time, the beer is subjected to heavy pressure (10—15 atmospheres), which as is known, accelerates the sterilisation. In addition, the surfaces on which the beer is heated are coated with silver, nickel or other metal known to have a germicidal effect, or the heating devices are constructed of such metal. The simultaneous action of heat pressure and germicidal surface enables the desired result of the sterilisation (which is effected quickly) to be completely attained.

In order more clearly to understand the nature of the invention, reference is made to the accompanying drawing, which illustrates diagrammatically and by way of example an apparatus suitable for carrying out the invention, and which operates as follows:—

The beer enters through the supply pipe A under a pressure of up to about 15 atmospheres, and in a cold state, flows through the annular space between the tubes B and C, and is there preheated, on the counterflow principle, by the hot

sterilised beer flowing between the tubes C and D. The preheated beer leaves the preheater by way of the pipe E and enters the intermediate chamber F of the steriliser. The walls of this chamber are not more than 1 mm. apart, and these walls, which are composed of, or coated with, silver, nickel, or a metal having a similar action, transmit the heat of the hot steam which is passed through the jackets G and H. In this steriliser the beer is raised from the admission temperature of below 60° C. to about 100—110° C. In order to effect the rapid cooling of the beer leaving the steriliser, it is passed through the pipe J into the preheater K for the fresh beer. To render the cooling more rapid and complete, the cold cooling brine is conducted through the outer jacket of the heat exchanger L.

If the pressure on the cooled beer were relieved by means of valves, considerable foaming would occur. To lessen this, the pressure is gradually relieved in the throttle coil M. The beer issues from the apparatus at N cooled to storage temperature.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is :—

1). A process for sterilising liquids such as beer, which comprises heating the liquid to be sterilised to a temperature of about 100° C. by passing it in the form of a layer or film not exceeding 1 mm. thickness, under a pressure of from about 10 to 15 atmospheres, over heated surfaces coated with or consisting of a metal adapted per se to exert by contact a high germicidal power, for a period of about 1 to 2 seconds and thereupon cooling said liquid.

2). The process for sterilising beer, substantially as described.

3). Apparatus for carrying out the process as set forth in claims 1 and 2, in which the heating and contact surfaces for the liquid to be sterilised are formed by a sterilising chamber of annular cross section adapted to be heated from the inner and the outer side, through which annular chamber the liquid to be sterilised is passed.

4). Apparatus as set forth in claim 3, in which a preheater is combined with the steriliser in such a manner that the liquid on the one hand, flows out of the preheater into the steriliser and, on the other hand, flows out of the steriliser over the preheater whereby it is cooled.

5). Apparatus as set forth in claims 3 and 4, in which tubes of such small cross section and such length that a gradual fall of pressure occurs therein, are connected to the steriliser.

6). The apparatus for sterilising beer, constructed, arranged, and operating substantially as described with reference to the accompanying drawing.

Dated this 7th day of August, 1930.

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